IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No:	10/524,205
Applicants:	Andreas Kohl et al.
Filed:	August 2, 2005
Title:	ELECTROHYDRAULIC BRAKE SYSTEM AND METHOD OF MONITORING IT
TC/A.U.:	3657
Examiner:	Thomas W. Irvin
Confirmation No.:	9988
Docket No.:	PC10496US
Notice of Appeal Filed:	September 8, 2010

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

S I R :

Appellants hereby request consideration and reversal of the Final Rejection of claims 15-28 dated June 8, 2010.

This Brief is presented in the format required by 37 C.F.R. § 41.37, in order to facilitate review by the Board. In compliance with 37 C.F.R. § 41.37(a)(1), this Brief is being filed within the time allowed for response to the action from which the Appeal was taken or within two months from the date of the Notice of Appeal, whichever is later.

The fees for filing a Brief in support of an Appeal under 37 C.F.R. § 41.20(b)(2) are provided herewith.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the following party: Continental Teves AG & Co. oHG.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences related to the subject matter of this Appeal.

III. STATUS OF CLAIMS

Claims 15-28 are pending and stand finally rejected. Claims 1-14 are canceled. Claims 15-28 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

Applicants filed an Amendment under 37 C.F.R. § 1.116 on July 29, 2010 in order to overcome the rejections under 35 U.S.C. § 112 (Second Paragraph) in the Final Rejection dated June 8, 2010. In an Advisory Action dated August 16, 2010, the Examiner indicated that the claim amendments in the Amendment overcame the rejections under 35 U.S.C. § 112 (Second Paragraph), and that the claim amendments would be entered for purposes of appeal.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

All references to the specification of the patent application presented hereinafter refer to the originally-filed clean copy of the substitute specification.

As set forth in independent claim 15, the presently claimed invention relates to an electrohydraulic brake system for motor vehicles having a brake-by-wire system (see the specification at paragraphs 0001 and 0013 and Figure 1). The system includes a hydraulic pressure source that can be actuated by means of an electronic control unit (see the specification at paragraph 0013; see also items 2, 16 and 'ECU' of Figure 1). The hydraulic pressure source is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump (see the specification at paragraph 0013; see also items 20, 21, 22 and 23 of Figure 1). The electronic control unit monitors the hydraulic delivery rate of the pump and determines quantities of gas or air at the suction side of the pump based on the monitored hydraulic delivery rate (see the specification at paragraphs 0004 through 0009, 0017 and 0018; see also Figure 1 and compare Figures 2a and 2b).

As set forth in independent claim 22, the presently claimed invention relates to a method of monitoring an electrohydraulic brake system for motor vehicles having a brake-by-wire system including a hydraulic pressure source (see the specification at paragraphs 0001 and 0013 and Figure 1). The hydraulic pressure source can be actuated by means of an electronic control unit (see the specification at paragraph 0013; see also items 2, 16 and 'ECU' of Figure 1). The hydraulic pressure source is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump (see the specification at paragraph 0013; see also items 20, 21, 22 and 23 of Figure 1). According to the method of claim 22, quantities of gas or air at the suction side of the pump are detected by determining the hydraulic delivery rate of the pump (see the specification at paragraphs 0004 through 0009, 0017 and 0018; see also Figure 1 and compare Figures 2a and 2b).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 15-28 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of the combination of U.S. Patent No 6,517,170 to Hofsaess et al. and U.S. Patent No. 4,255,088 to Newton et al.

VII. ARGUMENT

Rejection of claims 15-28 under 35 U.S.C. § 103(a) as obvious in view of the combination of U.S. Patent No 6,517,170 to Hofsaess et al. and U.S. Patent No. 4,255,088 to Newton et al.

Claims 15-28 stand rejected under 35 U.S.C. §103 as unpatentable over U.S. Patent No 6,517,170 to Hofsaess et al. and U.S. Patent No. 4,255,088 to Newton et al. Appellants respectfully traverse this rejection.

Independent claim 15 recites an "electrohydraulic brake system for motor vehicles having a brake-by-wire system including: a hydraulic pressure source that can be actuated by means of an electronic control unit and is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump, wherein the electronic control unit monitors the hydraulic delivery rate of the pump and determines quantities of gas or air at the suction side of the pump based on the monitored hydraulic delivery rate."

"To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2143. . Additionally, as set forth by the Supreme Court in KSR Int'l Co. v. Teleflex, Inc., No. 04-1350 (U.S. Apr. 30, 2007), it is necessary to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed.

The Final Office Action cites Hofsaess et al. as teaching an electrohydraulic brake system, but acknowledges that Hofsaess et al. "do not teach wherein a means is provided for monitoring the hydraulic delivery rate of the pump and determining quantities of gas or air at the suction side of the pump based on the monitored hydraulic rate." Newton et al. is cited for teaching these missing limitations.

Appellants respectfully submit that the Final Office Action does not provide a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed.

The relevant field of the claimed invention is electrohydraulic brake systems which utilize low viscosity hydraulic fluids. Newton et al. only explains the use of the pump thereof in the medical field, which generally has fluids having much higher viscosity. There is no reasonable basis for one skilled in the electrohydraulic brake system field to look to the medical devices of Newton et al. or to have any reasonable expectation of success utilizing a high viscosity device in a demanding low viscosity application. Since there is no reasonable basis to combine the cited references or a reasonable expectation of success, a *prima facie* case of obviousness has not been established.

Assuming for argument sake that the cited references could probably be combined, the references still fail to teach or suggest each limitation of the claimed invention. As will be described in greater detail hereinafter, in contrast to the language of claim 15, Newton et al. determines quantities of gas in the pump by analyzing the pump pressure as a function of the position of the pump piston. Newton et al. does not determine quantities of gas in the pump by analyzing the hydraulic delivery rate of the pump.

More particularly, as disclosed at column 2, lines 6-35 of Newton et al.:

> pump pressure and pump volume change are sensed and processed to yield compressibility data. Low compressibility is indicative of the absence of gas in the pump chamber since gas is compressible while the liquid which is to be pumped is not compressible. High compressibility is indicative of the presence of gas. A bubble of contained gas is indicated at 26 and can undesirably cause the liquid delivery rate to be less than that set for the pump.
>
> In order to obtain the pump pressure data, a pressure transducer 28, which may be of a conventional type such as that illustrated in FIG. 6, is connected to the chamber of pump 10. In order to obtain the pump volume change data, advantage may be taken of the fact that the lower surface area of piston 12, of course, remains constant over a pump cycle. Hence, the volume change is a function of piston position. As will be described hereinafter, any signal proportional to this position may be employed such as pulses derived from a photo optical shaft encoder 30 or from the output of an LVDT 32.
>
> The pump pressure data and piston position data is applied to motor control circuitry 34, the purpose of which is to control motor 16 and thus, the delivery rate of pump 10. (Emphasis added)

Newton et al. further explains at column 5, lines 51-56, that "circuitry 46 obtains compressibility data by determining the change of pump pressure with respect to change in pump volume to thus determine the amount of gas, if any, present in pump 10." (emphasis added). With this configuration, Newton et al. requires two sensors, a pressure transducer 28 and a shaft encoder 30 or LVDT 32, to measure both the pump pressure and the piston position data. From these two sensors, the control circuitry 34 determines the compressibility. Based on this compressibility determination, the control circuitry 34 determines the presence or absence of gas in the pump chamber. If the presence of gas is determined, based on the compressibility determination, the control circuitry 34 is configured to increase stroke rate to increase the flow rate based on an assumption that the flow rate is lower than the desired flow rate. See column 6, lines 44-68.

Newton et al. does not monitor the value of the flow rate, but instead adjusts the stroke rate based on the compressibility determination. In the Advisory Action, the Examiner points to the Abstract of Newton et al. which states that the flow rate may be corrected to the desired rate. The fact that the stroke rate, and thereby the flow rate, may be adjusted in response to compressibility determinations does not mean that the flow rate is monitored, and even more particularly, does not mean that a monitored flow rate is used to determine quantities of gas or air at the suction side of the pump. Newton et al. explains a specific manner, using compressibility data, to determine the presence of gas in the pump chamber.

This is contrary to the claimed invention, which monitors the hydraulic delivery rate and determines quantities of gas or air at the suction side of the pump based on the monitored hydraulic delivery rate. The claimed invention requires monitoring of a single variable, not two variables as in the Newton et al. system.

Since the references, alone or in any reasonable combination, do not teach or suggest each and every element as set forth in the claim, the Office Action has not established a *prima facie* case of obviousness. It is respectfully submitted that independent claim 15 is in condition for allowance. Claims 16-21 each depend from claim 15 and should each be allowed for at least the reasons set forth above.

Furthermore, dependent claim 16 further recites that "the hydraulic delivery rate is monitored by determining the electromotive force of the electric motor driving the hydraulic pump." Newton et al. does not suggest monitoring the electricmotive force nor using such measurement to monitor the hydraulic delivery rate. The Office Action does not to provide any support for this limitation being found in any of the cited references. Since the references, alone or in any reasonable combination, fail to teach or suggest each and every element as set forth in the claim, the Office Action fails to establish a *prima facie* case of obviousness.

Furthermore, dependent claim 17 further recites that "the hydraulic delivery rate is monitored by determining the electric power consumption of the electric motor driving the hydraulic pump." Newton et al. does not suggest monitoring the power consumption nor using such measurement to monitor the hydraulic delivery rate. The Office Action fails to provide any support for this limitation being found in any of the cited references. Since the references, alone or in any reasonable combination, fail to teach or suggest each and every element as set forth in the claim, the Office Action fails to establish a *prima facie* case of obviousness.

Furthermore, dependent claim 18 further recites that "the hydraulic delivery rate is monitored by determining the rotational speed of the electric motor driving the hydraulic pump." Newton et al. does not suggest using the rotational speed of the electric motor to monitor the hydraulic delivery rate. The Office Action fails to provide any support for this limitation being found in any of the cited references. Since the references, alone or in any reasonable combination, fail to teach or suggest each and every element as set forth in the claim, the Office Action fails to establish a *prima facie* case of obviousness.

Similar to claim 15, independent claim 22 recites a "method of monitoring an electrohydraulic brake system for motor vehicles having a 'brake-by-wire' system including a hydraulic pressure source that can be actuated by means of an electronic control unit and is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump, wherein quantities of gas or air at the suction side of the pump are detected by determining the hydraulic delivery rate of the pump."

As explained above, the cited references do not teach or suggest detecting quantities of gas or air at the suction side of the pump by determining the hydraulic delivery rate of the pump. Since the references, alone or in any reasonable combination, fail to teach or suggest each and every element as set forth in the claim, the Office Action fails to establish a *prima facie* case of obviousness.

It is respectfully submitted that independent claim 22 is condition for allowance. Claims 23-28 each depend from claim 22 and should each be allowed for at least the reasons set forth above.

VIII. CONCLUSION

In view of the arguments set forth above, all pending claims are patentable over the cited references. The rejection of all of the pending claims of record should therefore be reversed with instructions to issue a Notice of Allowability. Such actions are respectfully requested.

Respectfully Submitted,

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Enclosures: Claims Appendix
Evidence Appendix
Related Proceedings Appendix

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The Director is hereby authorized to charge or credit Deposit Account No. **18-0350** for any additional fees, or any underpayment or credit for overpayment in connection herewith.

CLAIMS APPENDIX

1. - 14. (Cancelled)

15. (Previously Presented) A electrohydraulic brake system for motor vehicles having a brake-by-wire system including:

a hydraulic pressure source that can be actuated by means of an electronic control unit and is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump, wherein the electronic control unit monitors the hydraulic delivery rate of the pump and determines quantities of gas or air at the suction side of the pump based on the monitored hydraulic delivery rate.

16. (Previously Presented) The electrohydraulic brake system as claimed in claim 15, wherein the hydraulic delivery rate is monitored by determining the electromotive force of the electric motor driving the hydraulic pump.

17. (Previously Presented) The electrohydraulic brake system as claimed in claim 15, wherein the hydraulic delivery rate is monitored by determining the electric power consumption of the electric motor driving the hydraulic pump.

18. (Previously Presented) The electrohydraulic brake system as claimed in claim 15, wherein the hydraulic delivery rate is monitored by determining the rotational speed of the electric motor driving the hydraulic pump.

19. (Previously Presented) The electrohydraulic brake system as claimed in claim 18, wherein the rotational speed is determined from the electromotive force of the electric motor driving the pump.

20. (Previously Presented) The electrohydraulic brake system as claimed in claim 15, wherein the actuating frequency of the electric motor amounts to 25 hertz.

21. (Previously Presented) The electrohydraulic brake system as claimed in claim 15, wherein the time constant of the low-pass filter amounts to 4 msec.

22. (Previously Presented) A method of monitoring an electrohydraulic brake system for motor vehicles having a brake-by-wire system including a hydraulic pressure source that can be actuated by means of an electronic control unit and is comprised of a hydraulic pump driven by an electric motor and a high-pressure accumulator adapted to be recharged by the pump, wherein quantities of gas or air at the suction side of the pump are detected by determining the hydraulic delivery rate of the pump.

23. (Previously Presented) The method as claimed in claim 22, wherein the hydraulic delivery rate is determined by analyzing the electromotive force of the electric motor driving the pump.

24. (Previously Presented) The method as claimed in claim 22, wherein the hydraulic delivery rate is determined by analyzing the electric power consumption of the electric motor driving the pump.

25. (Previously Presented) The method as claimed in claim 22, wherein the hydraulic delivery rate is determined by analyzing the rotational speed of the electric motor driving the pump.

26. (Previously Presented) The method as claimed in claim 22, wherein the rotational speed of the electric motor driving the pump is determined from the electromotive force of the electric motor.

27. (Previously Presented) The method as claimed in claim 22 wherein the actuating frequency of the electric motor amounts to 25 hertz.

28. (Previously Presented) The method as claimed in claim 22, wherein the time constant of the low-pass filter amounts to 4 msec.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None